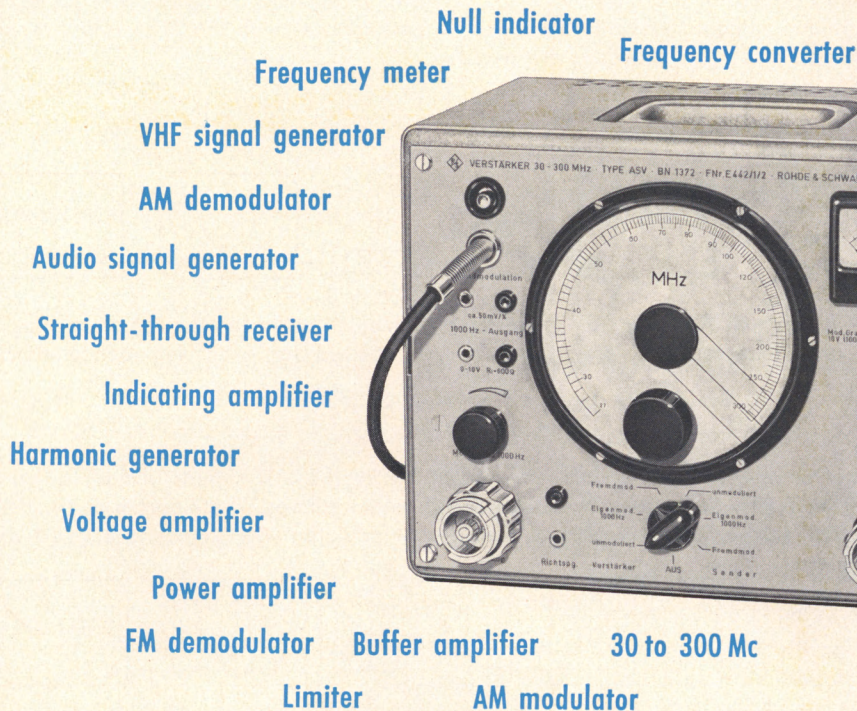


# TUNABLE VHF AMPLIFIER

30 to 300 MC

IMMEDIATE DELIVERY



A VHF measuring instrument which offers more possibilities than its name „amplifier“ suggests.

The Type ASV is a selective amplifier tunable in the range 30 to 300 Mc, a receiver and a signal generator.

An ideal combination of these three types of instruments in one set makes for extreme versatility. Moreover, the Type ASV extends the measuring possibilities of most R&S VHF precision instruments in special measuring problems. Because of its wide scope of application, small space requirement, and good performance, the Type ASV is a standard instrument in the VHF range. One or more sets of the Type ASV facilitate or make possible the solution of many measuring problems and often permit low-cost instrumentation of test departments.

Only a few examples of application can be quoted on the following pages, but many possible uses will suggest themselves in everyday laboratory and test-shop work.



# TUNABLE VHF AMPLIFIER ASV

## Use as a Receiver



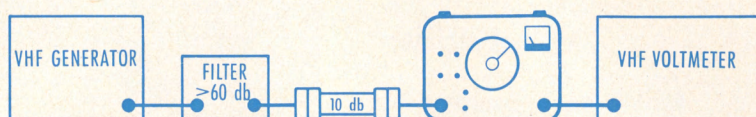
The Type ASV demodulates amplitude-modulated VHF signals, and thus is usable as a VHF receiver. The demodulated voltage is available at an output permitting connection of instruments for aural or oscillographic monitoring or for recording.

## Use as a Frequency Meter

The Type ASV measures frequencies in the VHF range and is useful even in high-precision measurements where the harmonics of a precision frequency generator are mixed with the unknown frequency. The order of a harmonic in the range 30 to 300 Mc is determined without ambiguity by a coarse measurement with the Type ASV, where the coupling to the test item is made so loose that reactions are avoided.

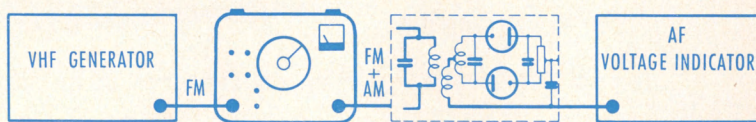
## Use as a Voltage Amplifier

The Type ASV is used to amplify small VHF voltages. An example is the investigation of the attenuation range of a filter with a VHF voltmeter where it is not permissible to apply a high voltage to the filter input. The high gain of the Type ASV makes measurements possible in the region of maximum stop-band attenuation even if an attenuator pad, e.g., Type DPF, is inserted for exact impedance matching.



## Use as an AM Modulator

The Type ASV modulates external or internal VHF signals. The modulation of the VHF signals is made either with the 1000-cps signal produced in the Type ASV or with an external modulation voltage. The diagram shows the test setup for the investigation of FM demodulation circuits. A frequency-modulated VHF signal is applied to the Type ASV and is amplitude-modulated. Then the VHF signal is used to investigate, for example, a VHF radio receiver for its capacity to suppress the incidental amplitude modulation.

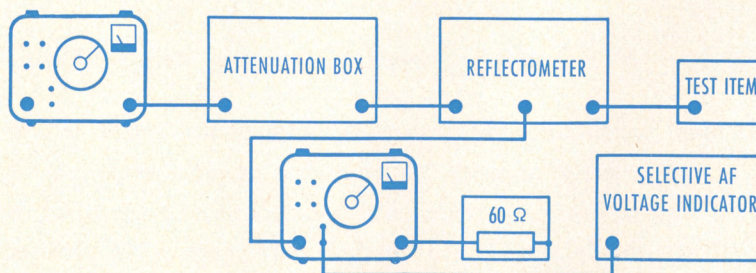


## Use as a Tunable Indicating Amplifier

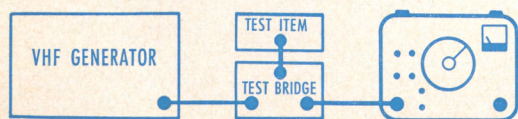
The Type ASV is used to amplify small VHF voltages. The indication is obtained on a built-in meter. The good far-off selectivity of the Type ASV heavily attenuates harmonics and spurious voltages so that the full sensitivity can be put to use.

## Use as a Voltage Indicator

Another example is the measurement of the reflection coefficient. The VHF signal of the Type ASV is applied to the test item via an attenuation box and a reflectometer. The voltages of the forward and of the reflected wave are indicated by a second Type ASV or by a subsequent voltmeter. The attenuation box is set to produce for the forward wave the same attenuation which the test item causes for the reflected wave. An appreciable increase in sensitivity can be obtained by modulating the VHF signal. The voltage derived from the reflectometer is demodulated in the Type ASV and indicated by a selective AF voltmeter.



## Use as a Null Detector

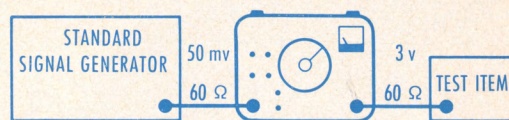


When the Type ASV is used as a null detector in a bridge or potentiometer circuit it operates with maximum gain in the vicinity of the bridge balance and its limiting action becomes effective with increasing unbalance. Maximum sensitivity is thus obtainable in the range of interest, while overloading of the meter is precluded.



### Use as a Power Amplifier

If the Type ASV is connected to the output of a standard signal generator to increase its output power one obtains, so to speak, a power signal generator. The voltage applied to the Type ASV may be frequency modulated if the frequency deviation remains within the specified bandwidth of the Type ASV.



### Use as a VHF Signal Generator

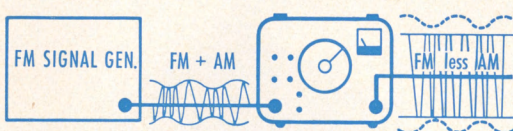
The Type ASV serves as a VHF voltage source for numerous measuring instruments. Any desired frequency within the band 30 to 300 Mc can be adjusted without range switching. The VHF signal delivered by the Type ASV is adjustable in fine increments and can be modulated from the built-in 1000-cps generator or from an external modulation source. The modulation depth is directly readable from the panel.

### Use as a Buffer Amplifier



Used as a buffer amplifier, the Type ASV avoids reactions on test items, for example frequency detuning of band-pass filters, oscillator tank circuits, etc. The voltage derived from the test item via a small capacitance often is too low for a voltmeter and can be amplified to a suitable value by the Type ASV.

### Use as a Limiting Amplifier



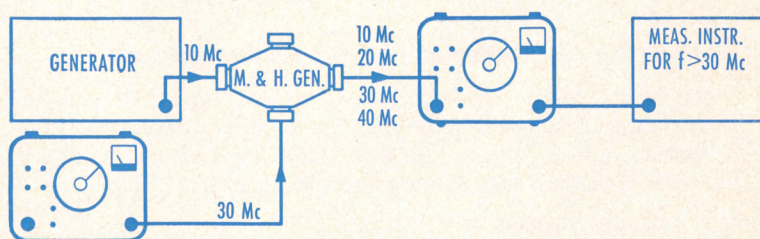
The Type ASV limits input voltages exceeding a given value. This limiter action is desired, for example, to suppress the incidental amplitude modulation of a frequency-modulated signal. The Type ASV inserted between the oscillator and the load not only amplifies the VHF signal but heavily reduces the incidental amplitude modulation. Thus it is possible to use simple single-stage oscillators as noise-free VHF voltage sources.

### Use as a 1000-cps Generator

The built-in modulation generator can be used independently. The Type ASV delivers an audio signal of 1000 cps for the operation of bridges, etc. The modulation frequency of 1 kc is available at a socket. The output voltage is adjustable. The panel meter indicates the open-circuit voltage.

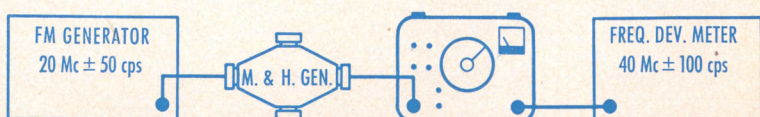
### Use as a Frequency Converter

In conjunction with the Mixer & Harmonic Generator BN13721 the Type ASV co-operates in frequency conversion. If measurements are to be made with instruments that are not suitable for the test frequency, then the test frequency can be converted to a suitable range by the Type ASV and the Mixer & Harmonic Generator.



### Use as a Harmonic Generator

The Type ASV plus the Mixer & Harmonic Generator can be used for frequency multiplication. For example, to produce a large frequency deviation with low distortion, it is advantageous to multiply a fundamental wave of small deviation. Since it is often difficult to measure small spurious frequency deviations caused by hum, etc., frequency multiplication by the Type ASV gives a considerably increased deviation and thus permits more accurate measurements.





Specifications

► Order Number BN 1372

Use as a VHF Amplifier

Frequency range . . . . .	30 to 300 Mc
Accuracy . . . . .	± 2 %
Bandwidth . . . . .	approx. 1%
Maximum gain . . . . .	approx. 40 db
Noise figure . . . . .	approx. 16 db
Input . . . . .	R&S connector Dezifix B (DIN 47285), adaptable*
Linear gain . . . . .	up to approx. 10 mv input voltage
Input requirement for optimum modulation characteristics . . . . .	greater than 50 mv
Input impedance . . . . .	suitable for source impedances of 50, 60 (75) Ω
Modulation . . . . .	internal and external
Internal modulation . . . . .	1000 cps, 0 to 95 %, adjustable
External modulation 30 cps to 30 kc . . . . .	0 to 95 %, modulation depth readable
Input for external modulation voltage . . . . .	telephone jacks, impedance 10 kΩ
Modulation requirement . . . . .	approx. 50 mv/%
Hum modulation . . . . .	0.01%
Incidental phase modulation, $\frac{\Delta f}{f_{mod}}$ . . . . .	less than 0.1, up to 30 % AM
Envelope distortion . . . . .	approx. 3 % at 90 % AM
Output . . . . .	R&S connector Dezifix B (DIN 47285), adaptable*
Output voltage . . . . .	approx. 30 mv to 3 v across 50 or 60 Ω, adjustable
Indication . . . . .	0 to 250 mv; 0 to 5 v; approx. 10 % when terminated with 50 or 60 Ω

Use as a VHF Signal Generator

Frequency range . . . . .	30 to 300 Mc
Accuracy . . . . .	± 2 %
Modulation . . . . .	same as for amplifier operation
Incidental frequency modulation, $\frac{\Delta f}{f}$ . . . . .	less than 2 parts in 10 <sup>5</sup> , at 30 % AM 1 kc
Output . . . . .	R&S connector Dezifix B (DIN 47285), adaptable*
Output voltage . . . . .	approx. 30 mv to 3 v across 50 or 60 Ω, adjustable
Indication . . . . .	0 to 250 mv; 0 to 5 v; approx. 10 % when terminated with 50 or 60 Ω

Use as a 1000-cps Generator

Output . . . . .	telephone jacks
Output voltage, open-circuit . . . . .	0 to 10 v
Source impedance . . . . .	600 Ω
Distortion . . . . .	1%
Indication . . . . .	0 to 10 v; approx. ±10%

\* If the Dezifix screw-in socket is removed, a screw-in socket of any other connector system can readily be inserted into the remaining 13-mm socket (DIN 47284).



Specifications (continued)

Use as a VHF Receiver

Frequency range for AM and FM reception . . . . .	30 to 300 Mc
Input (aerial) . . . . .	R&S connector Dezifix B (DIN 47285), adaptable*
Output for demodulated voltage . . . . .	telephone jacks

General Data

Power supply . . . . .	115/125/220/235 v, 47 to 63 cps (60 va)
Dimensions . . . . .	286 x 227 x 226 mm (R&S Standard Cabinet 35)
Weight . . . . .	12 kg

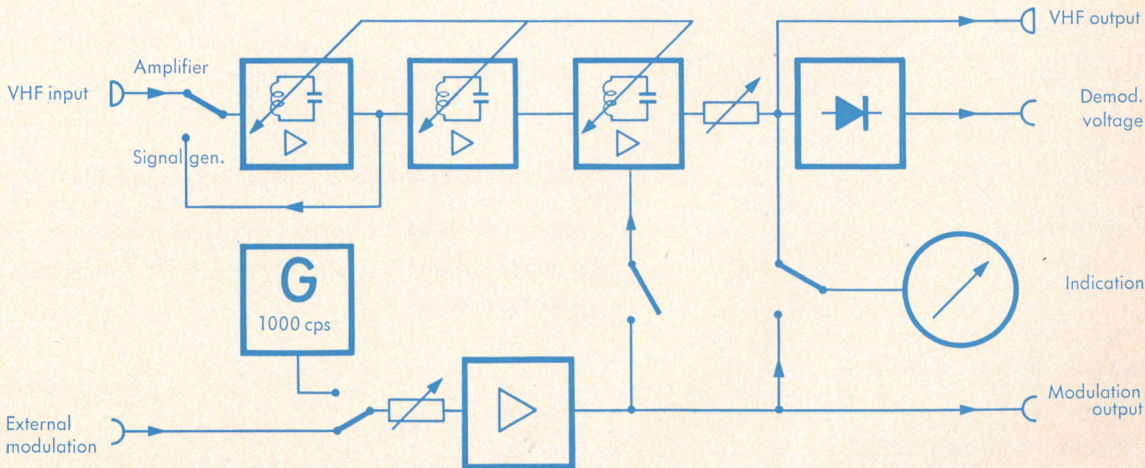
\* If the Dezifix screw-in socket is removed, a screw-in socket of any other connector system can readily be inserted into the remaining 13-mm socket (DIN 47284).

Description

The VHF signals applied to the input of the Type ASV are amplified in a three-stage tunable amplifier. The capacitances and the inductances of the tuned circuits are so adjusted that the range 30 to 300 Mc is covered without range switching. Input voltages up to about 10 mv are linearly amplified in the Type ASV, higher input voltages are progressively limited.

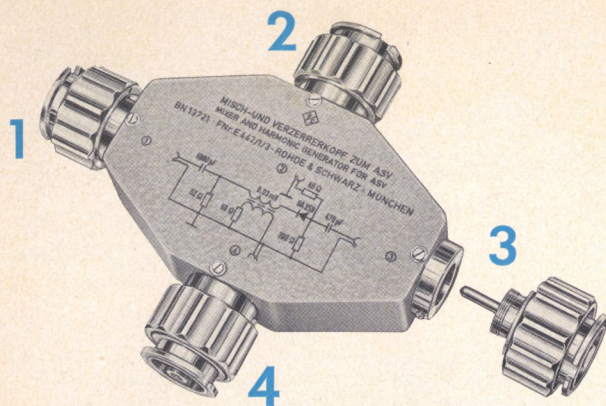
In operation as a signal generator, the first amplifier stage functions as a VHF oscillator while the other two stages provide for both amplification and buffering. The VHF signal can be modulated internally and externally. A built-in 1000-cps generator delivers the internal modulation voltage which is also available at an output after amplification in the final modulation stage. The modulation is achieved at the screen grid of the third VHF amplifier stage. In operation as an AM receiver or demodulator, the VHF signal is demodulated. The output voltage of the Type ASV is continuously variable and is also available demodulated at the demodulation output sockets. The panel meter indicates the VHF output voltage or the modulation depth. The electronically stabilized power supply ensures constant characteristics of the Type ASV in the case of AC supply fluctuations.

Valve complement: 2 x E 88 CC, 1 x PL 81, 1 x 85 A 2, 1 x EF 80, 3 x E 180 F.



Simplified block diagram of the Tunable VHF Amplifier Type ASV





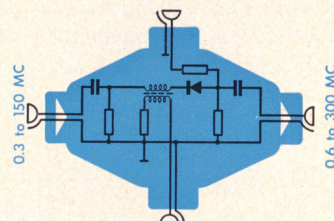
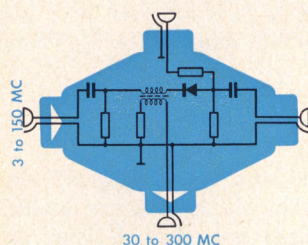
## MIXER & HARMONIC GENERATOR for Tunable VHF Amplifier Type ASV

► Order Number BN13721  
To be ordered separately.

The Mixer & Harmonic Generator considerably increases the applications of the Type ASV whose range is thus extended beyond the VHF region at both ends. The unit has four connectors which may be used as inputs and outputs as shown in the following examples.

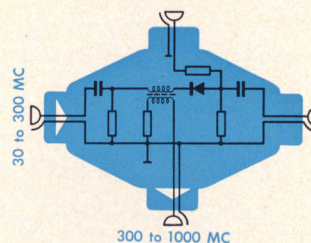
### Harmonic Generator Preferring Low Harmonics

The fundamental wave applied to connector 1 is distorted by the diode, and the harmonics are available at connector 3. The amplitude of the harmonics decreases with increasing order.



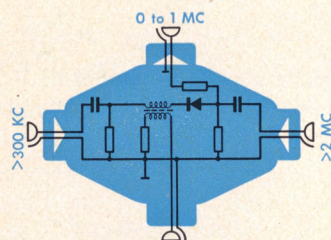
### Harmonic Generator Giving Levelled Spectrum

If the harmonics are derived from connector 4, one obtains a relatively well levelled spectrum since the low harmonics, which are close to the fundamental, are more heavily attenuated. The Type ASV may be connected to connector 4 to filter out a given harmonic.



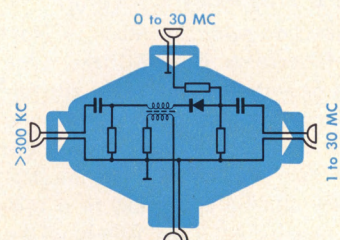
### Harmonic Generator Multiplying ASV Output Frequencies

If the output frequency of the Type ASV is applied to connector 1 of the Mixer & Harmonic Generator, connector 4 delivers harmonics which are above the frequency range of the Type ASV.



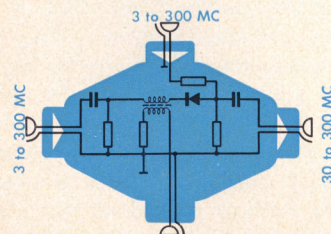
### Mixer for Generation of Low Mixture Products

If suitable frequencies, e.g. from the Type ASV, are applied to connectors 1 and 3, low mixture products are obtained at connector 2. Zero beat, resulting for example during frequency comparison, can be monitored aurally or by an oscilloscope. The conversion loss is about 10 db for a load impedance greater than 10 kΩ.



### Mixer for Generation of Medium Mixture Products

Mixture products below the range of the Type ASV can be obtained at connector 3 by applying suitable oscillator frequencies to the connectors 1 and 2. The conversion loss is about 14 db for a load impedance greater than 10 kΩ.



### Mixer for Generation of Mixture Products in the Range of the Type ASV

Mixture products within the range of the Type ASV are obtained at connector 3 when suitable fundamental frequencies are applied to the connectors 1 and 2. The conversion loss is about 25 db for a load impedance of 60 Ω.

#### Note

The conversion-loss specifications hold true if the amplitude of the auxiliary frequency is greater than that of the frequency to be converted and is at least 1 v. The Mixer & Harmonic Generator has four adaptable Dezifix B connectors. If the Dezifix screw-in socket is removed, a screw-in socket of any other connector system can readily be inserted into the remaining 13-mm socket (DIN 47284). Dimensions of the Mixer & Harmonic Generator 183 x 140 x 35 mm; weight 650 g.

We reserve the right to make any departures from this specification, especially those considered desirable for reasons of improved design.